

What is claimed is:

- 1 1. A method for segmenting a compressed bitstream, the method comprising:  
2 analyzing bit rate characteristics for the compressed bitstream; and  
3 parsing the bitstream into a video segment, wherein the video segment represents  
4 a portion of the compressed bitstream capable of being processed.
- 1 2. The method of claim 1 wherein the video segment comprises a group of coded  
2 pictures.
- 1 3. The method of claim 1 wherein the video segment comprises one of a coded  
2 frame and a video slice.
- 1 4. The method of claim 3 wherein the compressed bitstream has an MPEG format.
- 1 5. The method of claim 1 wherein the parsing further comprises transrating the video  
2 segment into a plurality of transrated video segments.
- 1 6. The method of claim 1 further comprising formatting the video segment into a  
2 video block.
- 1 7. The method of claim 6 wherein the video block includes a plurality of video  
2 segments, wherein each of the plurality of video segments has a different bit rate.
- 1 8. The method of claim 6 wherein the video block includes a plurality of video  
2 segments, wherein the plurality of video segments are adapted to be switched at video  
3 segment boundaries.
- 1 9. The method of claim 6 wherein the video block includes a video block header.
- 1 10. The method of claim 1 further comprising formatting the video segment into  
2 transport packet format.

- 1 11. The method of claim 10 wherein the formatting further includes partitioning the  
2 video segment into a plurality of transport packets.
- 1 12. The method of claim 10 wherein at least one of the plurality of transport packets  
2 includes stuffing bits.
- 1 13. A method for transrating a compressed bitstream into a plurality of output  
2 bitstreams having a bit rate, the method comprising:  
3 extracting a packet payload from the compressed bitstream;  
4 decoding the packet payload into at least one video frame;  
5 storing the at least one video frame in at least one frame buffer;  
6 providing data in the at least one frame buffer to a plurality of encoder outputs  
7 associated with the plurality of output bitstreams, each of the plurality of  
8 encoder outputs having a quantization scale factor; and  
9 adjusting the quantization scale factor for each of the plurality of encoder outputs  
10 to change the bit rate of the plurality of output bitstreams.
- 1 14. The method of claim 13 wherein the at least one video frame includes a DCT  
2 coefficient associated with a partial decode of the packet payload.
- 1 15. The method of claim 13 wherein the compressed bitstream is segmented into  
2 video segment processing units.
- 1 16. The method of claim 13 wherein at least one of the plurality of output bitstreams  
2 is segmented into video segment processing units.
- 1 17. The method of claim 14 wherein the video segment includes one of a group of  
2 coded pictures, a coded frame, and a video slice.

1 18. The method of claim 15 further comprising formatting the plurality of output  
2 bitstreams into a video block.

1 19. The method of claim 18 wherein the video block comprises at least one video  
2 segment and a video block header.

1 20. The method of claim 19 wherein the video block header comprises at least one of  
2 packet schedule information, compression statistics, and a video segment offset.

1 21. The method of claim 13 wherein the quantization scale factor is adjusted to  
2 reduce the bit rate by at least one of a fixed percentage and a fixed amount.

1 22. A method for multiplexing a plurality of program bitstreams, the method  
2 comprising:

3 providing a plurality of video blocks for each of the plurality of program

4 bitstreams;

5 determining a bit budget for an inspection period;

6 parsing a video block header for each of the plurality of program bitstreams to

7 determine video segment information;

8 selecting a video segment from each of the plurality of video blocks to meet the

9 bit budget; and

10 providing the selected video segments to an output buffer coupled to a

11 communications channel.

1 23. The method of claim 22 wherein the plurality of video blocks comprise a plurality  
2 of video segments, each of the plurality of video segments being encoded at a different  
3 bit rate.

- 1 24. The method of claim 22 wherein the selecting further comprises scheduling the  
2 video segments to fill the communications channel capacity.
- 1 25. The method of claim 22 wherein the selecting further comprises modeling a  
2 decoder buffer to avoid at least one of underflow and overflow.
- 1 26. The method of claim 22 wherein the video segment comprises a local stream  
2 segment for content insertion.
- 1 27. A system for segmenting a compressed bitstream, the system comprising:  
2 an analyzer module configured to analyze bit rate characteristics for the  
3 compressed bitstream; and  
4 a separator module configured to parse the bitstream into a video segment,  
5 wherein the video segment represents a portion of the compressed  
6 bitstream capable of being processed.
- 1 28. The system of claim 27 wherein the video segment comprises a group of coded  
2 pictures.
- 1 29. The system of claim 27 wherein the video segment comprises one of a coded  
2 frame and a video slice.
- 1 30. The system of claim 27 further comprising a transprocessor configured to  
2 transrate the video segment into a plurality of transrated video segments.
- 1 31. The system of claim 27 further comprising a formatter module configured to  
2 format the video segment into a video block.
- 1 32. The system of claim 31 wherein the video block includes a plurality of video  
2 segments, wherein each of the plurality of video segments has a different bit rate.

1 33. The system of claim 31 wherein the video block includes a plurality of video  
2 segments, wherein the plurality of video segments are adapted to be switched at video  
3 segment boundaries.

1 34. The system of claim 31 wherein the video block includes a video block header.

1 35. The system of claim 27 further comprising formatting the video segment into  
2 transport packet format.

1 36. The system of claim 35 wherein the formatting further includes partitioning the  
2 video segment into a plurality of transport packets.

1 37. The system of claim 36 wherein at least one of the plurality of transport packets  
2 includes stuffing bits.

1 38. A system for transrating a compressed bitstream into a plurality of output  
2 bitstreams having a bit rate, the system comprising:

3 an extractor module for extracting a packet payload from the compressed  
4 bitstream;

5 a decoder module for decoding the packet payload;

6 a plurality encoder outputs associated with the plurality of output bitstreams, each  
7 of the plurality of encoder outputs having a quantization scale factor; and

8 a quantization module for adjusting the quantization scale factor for each of the

9 plurality of encoder outputs to change the bit rate of the plurality of output  
10 bitstreams.

1 39. The system of claim 38 wherein the compressed bitstream is segmented into video  
2 segment processing units.

- 1 40. The system of claim 39 wherein the video segment includes one of a group of  
2 coded pictures, a coded frame, and a video slice.
- 1 41. The system of claim 39 further comprising formatting the plurality of output  
2 bitstreams into a video block.
- 1 42. The system of claim 41 wherein the video block comprises at least one video  
2 segment and a video block header.
- 1 43. The system of claim 42 wherein the video block header comprises at least one of  
2 packet schedule information, compression statistics, and a video segment offset.
- 1 44. The system of claim 38 wherein the quantization scale factor is adjusted to reduce  
2 bit rate by at least one of a fixed percentage and a fixed amount.
- 1 45. A bit rate switch for multiplexing a plurality of program bitstreams, each of the  
2 plurality of bitstreams having a plurality of video blocks, the switch comprising:  
3 means for determining a bit budget for an inspection period;  
4 means for parsing a video block header for each of the plurality of program  
5 bitstreams to determine video segment information;  
6 means for selecting a video segment from each of the plurality of video blocks to  
7 meet the bit budget; and  
8 means for providing the selected video segments to an output buffer coupled to a  
9 communications channel.
- 1 46. The switch of claim 45 wherein the plurality of video blocks comprise a plurality  
2 of video segments, each of the plurality of video segments being encoded at a different  
3 bit rate.

- 1 47. The switch of claim 45 further comprising a scheduler for selecting the video  
2 segments to fill the communications channel capacity.
- 1 48. The switch of claim 45 further comprising a decoder buffer model for modeling a  
2 decoder buffer behavior to avoid at least one of underflow and overflow.
- 1 49. The switch of claim 45 wherein the video segment comprises a local stream  
2 segment for content insertion.